THE ROLE OF INDIVIDUAL FOOD CHOICES TO TRANSFORM GLOBAL FOOD SYSTEMS

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1   TRANSFORMING GLOBAL FOOD SYSTEM: THE ROLE OF HEALTHIER AND MORE SUSTAINABLE DIETS

FOOD STIMULI ARE INTENSIVELY PROCESSED BY THE HUMAN BRAIN, and the resulting food choices have an essential impact on our life. In general, food choice is rooted in human behavior and guided by physiological needs. However, through the development of human society, the way humans choose food has changed according to the evolution of natural environment, physical needs, lifestyle, and development of technology. As a consequence of living in the industrialized society, overconsumption of refined, processed, and energy-dense foods has become the norm (McMichael et al., 2007). This phenomenon has been referred to as a "nutrition transition" and describes a shift that "accompanies the emergence of lifestyles characterized by lower levels of activity, which are reflected in nutritional outcomes, such as changes in average stature, body composition and morbidity" (Rayner and Lang, 2012: 195). A number of multidisciplinary studies have shed light on the importance of addressing individual food choice to tackle the current nutrition but also environmental crisis (e.g. Joyce et al., 2012; Lartey et al., 2016; Willett et al., 2019). Climate change, agriculture, and nutrition are inextricably linked. It has been shown that climate change will affect food quality and food prices, and reducing access to diverse, balanced and nutrient-dense food (Fanzo et al., 2018).

The way to improve dietary behavior is essentially embedded in our daily-life food choice and as such remains a big challenge. It is widely upheld that people's food choices and diets are very influential for our physical and psychological well-being (Grunert et al., 2007). Jacka et al. (2014) highlighted that dieting behavior and food choice have changed with global food systems, as the change of food supply (e.g., efficiencies of production, marketing, transport and sale of food) has resulted in a shift toward increased intake of unhealthy food.

Due to industrialized and urbanized living style nowadays, processed food has been easily accessible while consumptions of whole food decreased (McMichael et al., 2007). Processed food can be defined food altered with any deliberate change before being eaten, ranging from minimally-processed to heavily-processed foods

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(Duyff, 2017; Jones & Clemens, 2017). The former goes through less industrial process and preserves more of the original nutrition value (e.g., frozen and pre-cut vegetables or fruit, whole grains starch products, canned legumes and beans, and boiled or roasted fresh meat) (Monteiro, 2009). While the latter has less nutritional value and usually contains added sweeteners, saturated fats, artificial colors, excessive sodium, and preservatives (i.e., pre-prepared meals such as microwave meals, meat products such as hot dogs, refined starch products such as white breads, and snacks such as potato chips and sweetened confectionery) (Monteiro, 2009)

The ease with which we can access high-energy and palatable heavily-processed food has contributed to excessive energy intake and unhealthy food choices, making us overfed, but undernourished (Peters, et al., 2002). The current widespread of obesity and related chronic diseases are the results of increasing consumption of heavily-processed food instead of minimally-processed food (WHO, 2018). Today, 38.9% of adult populations worldwide, equals to 2 billion, are overweight and an estimated 40 million children under five were overweight. About 4 million deaths globally are related to food excess, which also increase the risk of morbidity in all age groups (FAO et al., 2019). The imbalance between energy intake and energy expenditure, which depends largely on food choice and eating habits, results in increasing risks of nutritional deficiencies, obesity, and other chronic disease (i.e., cardiovascular disease and diabetes) (FAO et al., 2019). Moreover, growing evidence suggests that unhealthy diets and food choices are risk factors also for mental disorders (i.e., eating disorders, depression, and dementia; (Jacka et al., 2014) as well as psychological distress (Gibson, 2006; Polivy & Herman, 1999)

The aforementioned unhealthy pattern of food consumption not only causes reduction of nutrition value of food and increases risks for several diseases but also has negative impacts on the environment. The recent IPBES Global Assessment (2019) has highlighted that the rate of global change occurred over the past 50 years has no precedent in history. Biodiversity loss has never been so fast. Land use change, due to agricultural expansion, is driving unprecedented impacts on terrestrial and freshwater ecosystems. Currently, 23% of the global terrestrial area faces a reduction in productivity due to land degradation (IPBES 2019). If this dietary pattern remains unchanged, the food system will be major contributors to an estimated 80 percent increase in greenhouse gas emissions by 2050 (Tilman & Clark, 2014).

Given that these negative impacts have considerably grown, promoting healthier and more sustainable food choices and better diets has been a new multidisciplinary research impulse. It has been shown that shifting consumption towards reduced ruminant and dairy intake is pivotal to progress towards sustainability and the Sustainable Development Goals (SDGs) of the 2030 Agenda of the United Nations (e.g. Johnston et al., 2014; Aleksandrowicz et al., 2016; Willett et al., 2019). Importantly, as highlighted by Mason and Lang (2017: 168), "no matter how good a diet is for health and the environment, if it is not available to everyone in a form that is culturally appropriate, such a diet cannot be judged sustainable".

In order to reduce the large global burden of physical and mental disorders as well as to protect the resources and the environment, large scale initiatives have been launched, substantiating the imperative for individuals and governments to improve population health by taking substantial actions in the domain of individual food choice and eating behavior (Jacka et al., 2014). Since food choice is crucial as it largely affects our health and our planet, as the first step, it is important to understand factors influencing our food choice and possible interventions so that the transformation of food system can be achieved.

2   DETERMINANTS OF INDIVIDUAL FOOD CHOICES

Generally, food choice could be influenced by several factors including biological (i.e., hunger, appetite, and taste), physical (i.e., access, skills of cooking, and time), psychological (i.e., mood and stress), cognitive (i.e., attitudes/preference, beliefs, and knowledge), social (i.e., culture, family, and peers), and economic determinants (i.e., cost and income) (Bellisle, 2003; Rozin, 2015). The circumstances that shape health outcomes also include "the distribution of money, power and resources at the global, national, and local levels, which are themselves influenced by policy choices" (Rayner and Lang, 2012: 191), as well as food prices, which fail to convey the true social and environmental cost of food production and consumption (Mason and Lang, 2017).

Comprehensive models of food choice behavior have been developed for understanding the process of making food choices (Furst et al., 1996; Eertmans et al., 2001). The hypothetical model proposed by Eertmans et al. (2001) consists of three levels of variables, namely, food-internal and food-external stimuli, food liking and anticipated consequences of consumption, and food choice (Table 1). While food choice is considered the ultimate dependent variable, influenced by food liking and anticipated consequences of consumption, they are dependent of food-internal and food-external stimuli. Importantly, this model emphasizes that these determinants are inter-related, and all contribute to the final food choice (Eertmans et al., 2001).

Table 1. Three levels of variables in the hypothetical model proposed by Eertmans et al. (2001).

| Level 1	
Food-internal stimuli	**Flavor:** the integration of several sensation including taste, smell, color and shape, texture, fat content, temperature, and sensation of pain.
Food-external stimuli	**Information:** information about nutrition or health claim
	Social environment: indirect influence includes belief, tradition, occasion. Direct influence includes the presence of others, family food rules, and social learning.
	Physical environment: food availability and accessibility.
Level 2	
Food liking: Innate food liking and acquired food liking through learning mechanism (e.g., exposure, conditioning, and social learning).fat content, temperature, and sensation of pain.	
Anticipated consequences of consumption: expectation and attitude towards nutrition and health.	
Level 3	
Food choice	

The aforementioned literature (Eertmans et al., 2001; Bellisle, 2003; Rozin, 2015) provided a crucial roadmap to understand the complexity of making food choices, but at the same time, the possibility of disentangling it, which allowed following research to explore suitable interventions and guidelines for improving food choices towards healthiness and sustainability. To make the comprehensive model of food choice even more intact, it is here proposed a new framework which also include food-related factors as well as biological, psychological, cognitive, culture, economical, and political determinants.

The framework shown in Figure 1 depicts factors contributing to final food choices at the individual level, including food-related internal and external factors (level1), personal-state and cognitive factors (level 2), and the ultimate dependent variable, i.e. the food choice (level 3). The final choice is influenced by "person-related factors" and "cognitive factors" which are dependent on "food-related factors". While cultural, economic, and political factors play a crucial, but hidden role in affecting the food choice at group level, we include them as contextual factors. Importantly, there are not only interactions within a factor but also between the factors, implying that how these factors may contribute to the final food choice is a dynamic process.

Level 1 contains factors affecting features or properties of food. The perception of flavor is categorized as food-internal factors, emphasizing that the taste, smell, color, shape, texture, temperature, and even pain sensation (i.e., irritation caused by chili pepper) may affect especially the biological need (e.g., hunger state) as well as the liking of the food (Eertmans et al., 2001). Food-external factor, here referring as food environments, can be defined as the geographic access to food in a community or neighborhood, consumer experiences inside food outlets, services and infrastructure in institutional settings, or even the information available about food (Rideout et al., 2015). This includes food-related information (e.g., inputs of both information on healthiness and sustainability as well as the integration of both information sources with existing knowledge), social environment (e.g. family and peers), and physical environment (e.g. product order and placement). Worth mentioning, contextual factors such as economic, cultural, and political factors may impact the accessibility, availability, and adequacy of food within a community or region (Rideout et al., 2015).

Thus, under the contextual factors, food environments may especially influence psychological state (e.g., mood), anticipated consequences of consumption (e.g., health concern), and food knowledge (e.g., nutritional facts). Identities such as eating identity (individual with healthy eating identity showed more fruit and vegetable intakes) (Kendzierski, 2007; Ma et al., 2018; Strachan and Brawley, 2009) and cultural identity (e.g., "Eating is a daily reaffirmation of cultural identity") (Kittler et al., 2012) are also affected. In brief, the factors at level 1 and level 2 as well as contextual factors (e.g., also price and policy) all contribute to the final food choice.

Figure 1. The proposed framework: an expansion based on Eertmans et al. (2001)'s model. The lines in the figure indicates the interactions between different factors.
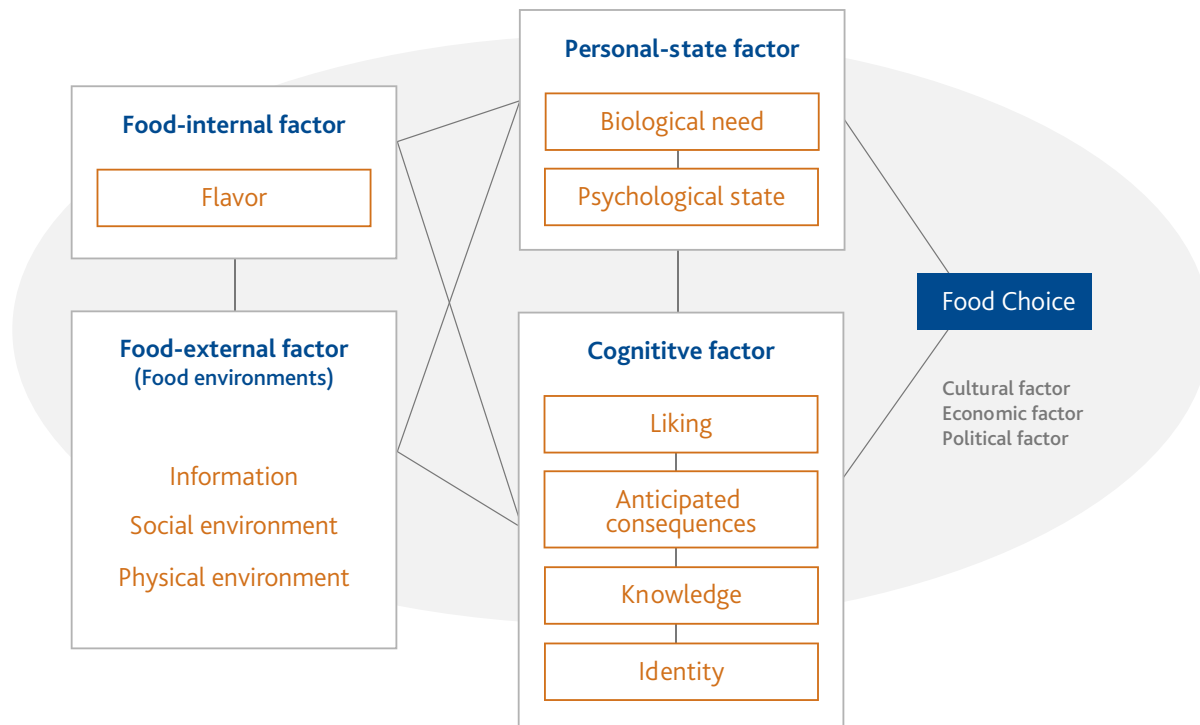
Understanding the determinants of food choice is essential to explore possible interventions to improve diets. Eertmas et al. (2001) have pointed out that nutritional intervention alone may not be effective and sufficient to improve dietary patterns due to a number of factors. First, the change of dietary patterns is related to people's ideas about food under the strong influence of culture, environment, and habits. Secondly, the conflict between short-term (e.g., liking) and long-term (e.g., expected consequence of consumption) outcomes. Thirdly, the gradual instead of immediate development of diet-related health problems which is also valid for environmental problems. Fourth, the requirement of long-term changes in food choice for risk reduction and disease prevention. Fifth, the physical feedback after adapting the dietary recommendation is not obvious.

To overcome these limitations, Eertmas et al. (2001) suggested two broad intervention strategies. The first one focuses on individual problem awareness, personal motivation, and skills through education and experience not only on health issues but also on flavor and liking. It has been shown that the effectiveness of nutritional information and knowledge are moderated by people's health concern and attitude towards healthy food (Engell et al., 1998). The second one emphasizes changing information or stimuli for directing food choice. The effect has been shown by changing food supply and variety, providing nutrition information at the point of choice, collaborating with food vendors, making worksite nutrition policies and incentives, and changing the structure of health and medical care (Eertmas et al., 2001).

More and more recent studies have provided evidence, examples, and directions about how these strategies can be implemented in practices, not only for improving health outcomes but also for promoting sustainability. Below an overview of the possible interventions to improve food choices is provided.

3.3 POSSIBLE INTERVENTIONS TO IMPROVE FOOD CHOICE

3.3.1 FOOD INFORMATION AND KNOWLEDGE

It has been well-documented that food-related information plays a potential role in influencing individual food choice. Thus, one possible intervention could be based on changing information inputs, including food education on food knowledge, comprehensible nutritional label and health/sustainability claims, and advertising of healthy/ sustainable food.

Food knowledge can be defined as knowledge of concepts and processes related to nutrition and health (Miller and Cassady, 2015) such as knowledge of diet and health or diet and disease, knowledge of foods as sources of nutrients, as well as knowledge of dietary guidelines and recommendations (Dickson-Spillmann and Siegrist, 2011; Miller and Cassady, 2015). A recent review paper has shown that long-term nutrition knowledge benefits healthy food choice through increased frequency and comprehension of food label use (nutrition label, health claims, and ingredients lists (Miller and Cassady, 2015; Steinhauser and Hamm, 2018). Several studies have also suggested that the food label use could significantly promote consumers' healthier food choice both at behavioral and neural levels (Barreiro-Hurlé et al., 2009; Cecchini and Warin, 2016; Grabenhorst et al., 2013). Among all the labeling schemes, interpretive labels such as traffic light labels is considered more effective compared to Guideline Daily Amount schemes and other food labels (Cecchini and Warin, 2016; Sonnenberg et al., 2013). With the supervision of the appropriate third-party (e.g. government), process labels can fill the informational gap between producers and consumers, as well as satisfy consumer demand for broader and stricter quality assurance (Messer et al., 2017). However, food label systems may have downside. It has been pointed out that in some cases, consumers may misinterpret labels and thus misalign their personal preferences and actual food purchases (Messer et al., 2017) and that the labels themselves can stigmatize food produced with conventional processes even when there is no scientific evidence that they cause harm, or compositionally different (Messer et al., 2017). Even though individuals' initial levels of nutrition knowledge are critical, some studies (see Miller and Cassady, 2015 for review) found that newly acquired food knowledge could also facilitate food label use.

Though the literature about food-related knowledge focuses mainly on nutrition or health-related knowledge, a recent study has shown that the environmental knowledge has a positive effect on the strength of the relationship between attitude and the purchase intention for environmentally sustainable products (Kumar et al., 2017), indicating that environment-related knowledge input may play a role in making food choice.

Food advertising, mostly through TV channels, has been recognized as a source of information that have strong effects on individual food choice, especially towards unhealthy foods. For instance, individuals exposed to food

advertising chose 28% more unhealthy snacks than those exposed to non-food advertising, with 65 kcal higher consumption of total calories. And the effect was profound when individuals were cognitively occupied by other tasks, resulting in 43% more unhealthy snacks, with 94 kcal higher consumption of total calories (Zimmerman and Shimoga, 2014).

Unhealthy food advertising has even more negative impacts on children than on adults (Boyland et al., 2016). For example, in the USA[2], 50% of all the time for advertising are occupied by unhealthy food advertising (34% for candy and snacks, 28% for cereal, 10% for fast food, 4% for dairy products, 1% for fruit juices, and 0 percent for fruits or vegetables). Children who watch more than three hours of television a day are 50% more likely to be obese than who watch fewer than two hours. Moreover, every hour more in TV viewing per day increases intakes of sugar-sweetened beverages, fast food, red and processed meat, and overall calories (48.7 kcal/day on average). Nevertheless, as a means of communication, healthy eating or anti-obesity advertising could also encourage a reduced demand of unhealthy food among overweight individuals (Wang et al., 2018). However, worldwide, extreme imbalance between the marketing of healthier food (i.e., fruits, vegetables, whole grains, low-fat or non-fat milks, lean meats, poultry, fish and beans) and marketing of unhealthy food still exists (see Kelly et al., 2019 for a review).

3.3.2   SOCIAL ENVIRONMENT

Both at the time of purchase and at the time of intake, individuals' food choices are influenced by physical and social environments. In the domain of social environment, with the goal of achieving healthy dietary patterns, research has indicated that social bond with one's eating companion, similarity of the eating companions to the self (e.g. gender or age), and the social network (especially peers and family), are three important factors affecting one's food choice providing relevant reference points for proper eating behavior (see Cruwys et al., 2014 for a review). Especially, from food choice, dietary patterns, to public health problems such as obesity and eating disorders, the great influence from peers and family should be considered. For example, in adults, the eating pattern most likely to be shared by socially connected individuals was 'alcohol and snacks (Pachucki et al., 2011). For children, they develop healthy eating habits by modeling peers and parents, resulting in increased vegetable and reduced fat intakes (Bevelander et al., 2012; Tibbs et al., 2001). Students staying with colleges who showed healthy eating norms adopted healthy diets and exercise (Gruber, 2008). Importantly, individuals' weight can be predicted from that of their friends as well as the obesity clusters in social networks (Badaly, 2013; Christakis & Fowler, 2007).

To improve food choice and dietary patterns, community reinforcement approach with a supportive social network (Meyers et al., 2005) has shown positive influence on one's energy balance and diet composition. By setting social norms regarding food and exposing them to certain foods, parents can direct children's eating habits (Clark et al., 2007; Golan & Crow, 2004). Regarding the influence of peers, the 'Food Dudes' program aimed at modeling the preference for fruit and vegetables through featuring heroic peers has been proved to affect food consumption patterns in schoolchildren for short and medium term (Horne et al., 2004, 2009; Lowe et al., 2004). Although there

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2. The impact of food advertising on childhood obesity: https://www.apa.org/topics/kids-media/food

is no clear evidence that social influence from peers can help reducing preferences for unhealthy high-energy-dense foods, it is possible for children (Greenhalgh et al., 2009; Horne et al., 2004) and young female adults (Robinson & Higgs, 2012) to be affected by the peer's food rejection or aversion, indicating the possible role of peer in reducing unhealthy food intakes.

In a broader context, social environment is particularly influenced by culture, and together they shape the unique cultural identity based on food consumption. Indeed, food and eating habit are a daily reaffirmation of ethnic, cultural, and social identity which are often linked to religious beliefs or ethnic behaviors within a cultural group (Kittler et al., 2012; Scholliers, 2001). The creation of "local identity" happened when a food product or recipe is produced, differentiating local cultures and diets from others (Capatti and Montanari, 2003). In recent years, the significance of culturally based food habits on health and diet has been recognized (Kittler et al., 2012). Therefore, when we talk about individual food choice, the influence of culture on social environment and identity should not be overlooked.

3.3.3 PHYSICAL ENVIRONMENT

As mentioned in previous sections, interventions through information or social environment depends on individuals' conscious, deliberated, and rational reasoning in order to achieve behavioral changes of food choice. However, some other strategies could be effective under unconscious and automatic conditions. A possible intervention based on behavioral economics is nudging, a strategy of triggering automatic changes of food choice or intakes through altering environmental cues (Broers et al., 2017) in order to promote healthier and more sustainable food choices. There are several categories of nudging strategies, for example, provision of information (e.g. food labeling to activate a rational choice), changes in the physical environment (e.g. product placement), changes in the default policy (e.g. default menu, food sizes and portions) and use of social norms and salience (e.g. comparison with average consumers, facilitation of social interaction between consumers) (Bucher et al., 2016; House of Lords, 2011; Wilson et al., 2016). In the domain of physical environment, we focus on how dietary patterns and food intakes can be influenced according to how choices are presented within meal or consumption environments (Hansen and Jespersen, 2013).

Previous studies have demonstrated that by changing the size of dishware, portion sizes may be reduced leading to unconscious changes in actual food intake (Skov et al., 2012) and meal composition (Libotte et al., 2014). Moreover, food positioning is thought to influence food choice. Studies have shown that people eat more unhealthy food such as chocolate if it is located more prominently (Wansink et al., 2006). However, obese adults selected a greater amount of low-energy dessert if it was placed more saliently (Levitz, 1976). Positional changes such as food product order (e.g., the food sequence on a buffet) or proximity (e.g., placing unhealthy foods further from the consumer) had a positive influence on food choice (Bucher et al., 2016). Indeed, altering placement of food can also increase fruit and/or vegetable choice, sales or servings (Broers, 2017). Also, repositioning healthy food products increases sales of the healthy products displayed in the checkout counter display and this nudging effect lasted over a period of 4 weeks (Van Gestel et al., 2018).

Another example of nudging food choice could be the design and the presentation of menu in canteens or restaurants. " A study found that compared to conventional menu, a default menu with appealing meat-free options increased the probability of being chosen, indicating that food service agent could encourage pro-environmental food choice through this kind of nudging strategy (Campbell-Arvai et al., 2014). Moreover, with a survey of people eating at the restaurant, an innovative menu containing a range of food-related information, including health (food provenance and nutritional value) and environmental (local produce and carbon) attributes, did contribute to people's food choice (Filimonau et al., 2017). The EU countries spent 564 billion Euros on catering services in 2016. This highlight of the importance of considering the food-service industry when addressing the challenges related to problems of global food systems.[3,4]

3.3.4   NEW TECHNOLOGIES

Accompanying with the development of artificial intelligence technique, smart-phones and Apps are commonly and frequently used also for accessing food-related information and improving diets (Guthrie et al., 2016). For example, consumers can use an online interactive tool "MyPlate" developed by US government[5] to gain nutrition information, to create a personalized food plan with personal data, and to track change of dieting behavior according to personalized goals (Post et al., 2012). More and more Apps provide consumers with personalized assistance for grocery shopping, dietary needs, and exercise monitoring.

For instance, Nutrino[6] is a provider of nutrition-related data services, analytics, and technologies, via a large and adaptable digital platform. Another example is MyFood Repo[7], an openly accessible database of barcoded food products in Switzerland which emphasize the benefits to digital epidemiology and personalized nutrition. By observing users' usage of the database, it can help us understand underlying causes, the potential treatments and prevention strategies of diet-related diseases by analyzing population and individual dieting patterns. A web-based pan-European study, Food4Me, concluded that personalized nutrition advice was more effective, causing more changes in dietary behavior, as compared to population-based nutritional advice (Verma et al., 2018). The advantage of all these tools are centered at providing customized services based on consumer characteristics in order to fulfill healthy food choices and diets. However, considering legal and ethical aspects, it is important to protect individuals' privacy and to limit the access to individuals' personal data in order to prevent the discrimination of treatment (e.g., health insurance) and the data from being used for inappropriate commercial purposes.

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3. Household consumption expenditure on catering services in the European Union (28 countries) from 2008 to 2016 (in million euros): https://www.statista.com/statistics/609961/catering-services-consumption-expenditure-europe-eu-28/

4. Catering for sustainability: Making the case for sustainable diets in foodservice. https://www.foodethicscouncil.org/app/uploads/Catering%20for%20Sustainability_SUMMARY%20REPORT.pdf

5. Choose my Plate: https://www.choosemyplate.gov/

6. Nutrino: https://www.nutrinohealth.com/

7. MyFood Repo: https://www.foodandyou.ch/en/my-food-rep

3.3.5 POLICY INTERVENTIONS

Policy instruments are fundamental to shift towards more sustainable and healthy diets, at the international, national and municipal level. On the agriculture production side, a number of interventions can be devised: from the promotion of integrated land-use policies, to investments on education and training for farmers; and the provision of services and tools (such as, insurance and loans) also to increase access to early warning systems (Fanzo et al., 2018). As the most exposed communities to climate change impacts will be urban and rural poor in low and middle-income countries, it is pivotal to build social protection systems that reduce their vulnerability to shocks impacting food security, as well as improve healthcare facilities to address climate-related diseases (Fanzo et al, 2018).

The NOURISHING Framework (World Cancer Research Fund International, 2019)[8], provides a comprehensive overview of the policy areas and actions to promote healthy diets, reduce obesity and non-communicable diseases. This includes interventions in the domain of food environment, food system and behavior change. Policy options in the food environment area include: setting standards for the provision of healthy food in public institutions; using targeted subsidies, health-related food taxes and purchase incentives that address healthy food affordability; providing incentives for building a retail environment that enable healthy food choices (e.g. restriction of in-store promotions on unhealthy food); improving food quality through reformulation of products, elimination of trans fats and so on. Actions in the food system domain are mainly related to the need to ensure coherence between health and agriculture policy and include policy actions such as, establishing nutrition standards for public procurement, support urban agriculture in health policies, establish community food projects, improving healthiness of ingredients by working with food suppliers. A regularly updated database is also provided to explore implemented policies across the world.
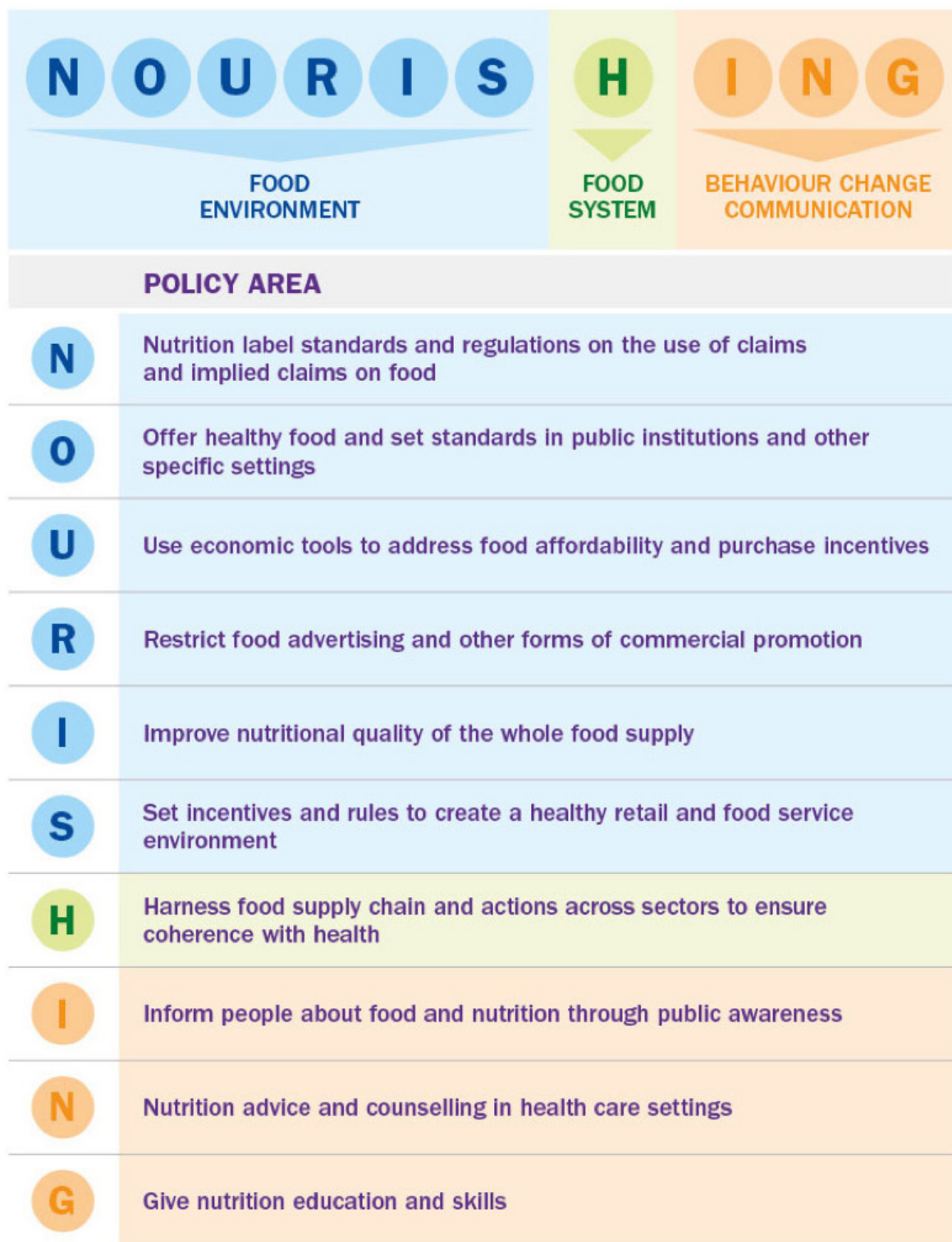
Some authors have highlighted that reversing current dietary trends will also require disincentives for unhealthy eating, with interventions ranging from the application of carbon taxes, to the removal of subsidies, the support to meat-alternatives, to the prioritization of health outcomes to shape agricultural policy (Fanzo et al., 2017).

Devising and implementing cross-cutting approaches to tackle the multiple challenges regarding food environments, taking into consideration local characteristics, as a whole need to be upscaled to support the advocated dietary change at the global level (Springmann et al., 2018).

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8. Nourishing framework and policy database: https://www.wcrf.org/sites/default/files/PPA_Nourishing_Framework_A5%20Leaflet_WEB.pdf

Figure 2. NOURISHING Framework[9]

N O U R I S	H	I N G
FOOD ENVIRONMENT	**FOOD SYSTEM**	**BEHAVIOUR CHANGE COMMUNICATION**

POLICY AREA

N	Nutrition label standards and regulations on the use of claims and implied claims on food
O	Offer healthy food and set standards in public institutions and other specific settings
U	Use economic tools to address food affordability and purchase incentives
R	Restrict food advertising and other forms of commercial promotion
I	Improve nutritional quality of the whole food supply
S	Set incentives and rules to create a healthy retail and food service environment
H	Harness food supply chain and actions across sectors to ensure coherence with health
I	Inform people about food and nutrition through public awareness
N	Nutrition advice and counselling in health care settings
G	Give nutrition education and skills

9. This material has been reproduced from the World Cancer Research Fund International NOURISHING framework and policy database. www.wcrf.org/NOURISHING

4 CONCLUSION

Global food systems are in need of profound and rapid transformation in order to build more resilient, equitable and sustainable societies, where humankind, natural ecosystems and animal species can thrive and prosper. A fundamental role to shape current food systems is played by citizens, which, as eaters and consumers act on food systems and can exert their power on food agents in multiple ways and multiple times a day. The role of eaters as consumer is at the interception between two of the major global challenges. By understanding determinants of food choice as well as possible interventions under appropriate cultural, economic, and politic contexts, it is possible to reduce the impact on the environment, while benefitting health, longevity and well-being, through healthier and more sustainable food choices.

Beacons of hope can be observed in other areas, from the increase of public engagement on climate-related issues, to progress in corporate commitment not only to internalize negative externalities but also to positively contribute to societal needs, as well as the increasing mobilization and cooperation of municipalities across different geographies to improve urban food systems.

The pace of change is, however, still insufficient. The current trends in biodiversity loss, greenhouse gas emissions, water overuse and pollution, clearly show that we are still far from preserving the health of the planet. On the other hand, the increase in overnutrition and obesity in both developed and developing countries, as well as the persistence of hunger and lack of food access to over 820 million people in the world (FAO et al., 2019), compounded by climate change impacts on agriculture, livelihoods and access to healthy diets, make food systems also disappointing in terms of nutritional outcomes. This global picture underscores the immense challenge of achieving the SDGs by 2030.

The transformation that need to take place is complex and multi-faceted and require bold strategies to be devised, applied and mainstreamed by all the actors along the value chain. Food system transformation involves a re-thinking of the first phases of the supply chain by scaling out and up sustainable farming practices to preserve, recover and nourish soils, also to work as carbon sinks; to reduce the pressure on scarce freshwater resources while unlocking the potential of rainfed agriculture; to adapt to climatic alterations which involve changes in temperatures, precipitation patterns and evapotranspiration conditions. Climate-smart agriculture is a promising pathway, especially if coupled with nutrition- and gender-sensitive approaches (Fanzo et al., 2018).

From the scientific point of view, it is pivotal to approach these challenges with interdisciplinary collaborative efforts among natural, social and political sciences, as well as humanities. Policy makers, national and municipal governments, businesses, NGOs have all a role to play in this transition process.

Finally, societal debates and movements can exert pressure on governments, institutions and administrations at the global, regional and local level to accelerate the process of transition by spurring the implementation of a supportive and coherent policy environment where sustainable and healthy food systems can be part of the solution to the global societal, environmental and nutritional crisis rather than part of the problem. Moreover, they should also push for a transformative change in the whole supply chain, from the field to distribution.

Food is a cross-cutting issue and a fundamental link throughout all the SDGs, from ending hunger to building more sustainable cities and cooperating for achieving the Goals. Through individual daily choices, people can actively push for the transformation they want to see in the food system and give a hint to the market and food agents on how the future of food should be like. Our own health and the health of the planet are inextricably intertwined, and it is time to act.

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